



SEQUENCE LISTING

RECEIVED

JAN 07 2002

TECH CENTER 1600/2900

B1

<110> ITO, Makoto
<120> Ceramidase Gene
<130> 1422-0493P
<140> 09/937,521
<141> 2001-09-26
<150> PCT/JP00/01802
<151> 2000-03-24
<150> JP 11-84743
<151> 1999-03-26
<160> 18
<170> PatentIn version 3.1
<210> 1
<211> 21
<212> PRT
<213> Mus sp.
<220>
<221> MISC_FEATURE
<222> (1)..(21)
<223> any Xaa = any amino acid, unknown, or other

<400> 1

Phe Ser Gly Tyr Tyr Ile Xaa Val Xaa Arg Ala Asp Xaa Thr Gly Lys
1 5 10 15

Val Asn Asp Ile Asn
20

<210> 2
<211> 10
<212> PRT
<213> Mus sp.
<220>
<221> MISC_FEATURE
<222> (1)..(10)
<223> any Xaa = any amino acid, unknown, or other

<400> 2

Ala Ile Ala Thr Asp Thr Val Ala Xaa Met
1 5 10

Opto
B1

<210> 3
<211> 35
<212> PRT
<213> Mus sp.

<220>
<221> MISC_FEATURE
<222> (1)..(35)
<223> any Xaa = any amino acid, unknown, or other

<400> 3

Gly Tyr Leu Pro Gly Gln Gly Pro Phe Val Asn Gly Phe Ala Ser Ser
1 5 10 15

Asn Leu Gly Asp Val Ser Pro Asn Ile Leu Gly Pro Xaa Xaa Val Asn
20 25 30

Thr Gly Glu
35

<210> 4
<211> 17
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic oligonucleotide primer 53-S1 directed to gene derived f
rom Mus sp. liver

<220>
<221> misc_feature
<222> (1)..(17)
<223> any n = a, c, g, t, any, unknown, or other

<400> 4
carggcncnt tygtngc

17

<210> 5
<211> 17
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic oligonucleotide primer 53-A3 directed to gene derived f
rom Mus sp. liver

<220>
<221> misc_feature

Out
B1
<222> (1)..(17)
<223> any n = a, c, t, g, any, unknown, or other

<400> 5
ggnccnagda trttngg 17

<210> 6
<211> 38
<212> DNA
<213> Mus sp.

<400> 6
gcaggctttg cttcatcaaa tctcggagac gtgtcacc 38

<210> 7
<211> 19
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic oligonucleotide primer MA1 directed to gene derived from Mus sp. liver

<400> 7
ttgatgaagc aaagcctgc 19

<210> 8
<211> 19
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic oligonucleotide primer MA2 directed to gene derived from Mus sp. liver

<400> 8
ggtgacacgt ctccgagat 19

<210> 9
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic oligonucleotide primer T7in directed to gene derived from Mus sp. liver

<400> 9
taatacgact cactataggg 20

<210> 10

Cont
B1

<211> 17
<212> DNA
<213> Artificial Sequence

<220>

<223> Synthetic oligonucleotide primer T7out directed to gene derived from Mus sp. liver

<400> 10

tctgctctaa aagctgc

17

<210> 11

<211> 3108

<212> DNA

<213> Mus sp.

<400> 11

cctgcgccac ttctctctcc cggctcaatc ggggagcctt ttctctcccc cgtctcgccg 60

ctgccgccat ctccaccctt gcctgcccc a ggggtctgtg gacgcccggg cagagagcaa 120

gcaccgagct gggcctgctg gagaccggag accagcggcc cgcccggccg cccgctgcga 180

gcctcctgag cagctccgga acagcttact ttctgtttcc atctctttcg gaccgggttg 240

gcctctccaa aagccacttc tcttaactct tatcaagggtt caaaggctaa aggtctgtac 300

acatgagtgc tgggtgtgctt agaggcatcg ggtccctttc agctggagtt gcagtacttg 360

tgagtgccat ggaatccaaa ttgggcaaga gatacaatct aaactctcaa ctactccaga 420

ttcaagggttc acctcacttt ctggttacca aaggagcttt gcggggccgc tctgacatcc 480

agtagatttg gaaacacatt gagaaatcag cctgagcaac ctgcaaggca caaggcacia 540

gattctgcat gggtatttgc tctcccagga ggtgaacact tgttttgatt cacagagtca 600

gggttgagat gccagttgt tctcatctt ggctcagaag aagcacctag gaataaaagc 660

tctaagctgg tattaagtag aatgggctta aagtccacta caggaaacaa cagctagtga 720

cagaaatggc aaagcgaacc ttctccacct tggaggcatt cctcattttc cttctggtta 780

taatgacagt catcacagtg gcccttctca cctcttgggt tgttaccagt gggaccattg 840

aaaaccacaa agattcagga aatcactgggt ttccaaccac tctgggctcc acgacaaccc 900

agccccctcc aattacacag actccaaact tcccttcatt tcggaacttc agtggctact 960

acattggcgt tgggagagcg gattgcacag gacaagtgtc agatatcaat ttgatgggct 1020

atggcaaaaa tggccagaat gcacggggtc tctcaccag gctgttcagc cgtgctttta 1080

tcttggcgga tccagatggg tcaaatcgaa tggcatttgt gagcgtggaa ctatgtatga 1140

tttcccaacg actgaggttg gaggtcctga agagactaga gagtaaatat ggctctctgt 1200

Ant
B1

atcgaagaga caatgttata ctgagtgcc a ttcacacaca ctctggccca gcagggtttt 1260
tccaatatac actctatata ctgccagcg agggattcag caaccggacc tttcagtaca 1320
tagtctctgg gatcatgaag agcattgata tagctcacac aaatcttaaa ccaggcaaaa 1380
tctttatcaa caaaggaaat gttgctaattg tgcagatcaa ccgaagcccc tcctcttacc 1440
ttctgaatcc acagtcagag agagcaaggt attcttcaaa cacagacaag gaaatgctgg 1500
tcttgaaact ggtggatttg aatggagaag acttgggtct tatcagctgg tttgccatcc 1560
aaccogtgag catgaacaat agcaaccact ttgtgaatag tgacaatatg ggctatgcgg 1620
cttacctttt tgagcaagaa aagaacaaag gctatctgcc tggacaggga ccgtttgtag 1680
caggctttgc ttcatacaat ctgggagacg tgtcacccaa cattcttggc ccgcattgtg 1740
tcaacacagg ggagtcttgt gacaacgaca agagcacctg tcccaacggg gggcctagca 1800
tgtgcatggc cagcggacct ggacaagaca tgtttgagag cacacacatt ataggacgga 1860
tcatctatca gaaggccaag gagctgtatg cctctgcctc ccaggagggtg accggcccag 1920
tgcttgacgc tcaccagtgg gtgaacatga cagatgtgag cgtccagctc aatgccacac 1980
acacagtga gacgtgtaaa cctgccctgg gctacagttt tgccgcaggc acaattgatg 2040
gagtttcggg cctcaatatt acacaggga ctacggaagg ggatccattc tgggacactc 2100
ttcgggacca gctcttggga aaaccatctg aagagattgt agagtgtcag aaacccaaac 2160
caatcctgct tcacagtga gagctgacga taccacatcc ttggcaacca gatattgttg 2220
atgttcagat tgttacggtt gggtccttgg ccatagctgc tatccctggg gaattaacaa 2280
ccatgtcggg acgaagattt cgtgaggcaa ttaaaaaaga atttgcactt tatgggatga 2340
aggatatgac cgttgttatc gcagggtctaa gcaatgttta tacacattac attaccacat 2400
atgaagaata ccaggctcag cggtaagagg cagcatctac aatctatgga ccacacaccc 2460
tgtctgcata catccaactc ttcagagacc ttgctaaggc aattgctacg gacacagtag 2520
ccaacatgag cagtgggtccc gagcctccat tcttcaaaaa tctaatagct tcacttattc 2580
ctaataattgc ggatagagca ccaattggca aacattttgg ggatgtcttg cagccagcaa 2640
aacctgaata cagagtggga gaagtgggtt aagttatatt tgtaggcgct aacccaaaga 2700
attcagcaga gaaccagacc catcaaacct tcctcactgt ggagaaatac gaggactctg 2760
tagctgactg gcagataatg tataacgatg cctcctggga gacgaggttt tattggcaca 2820
aaggaatact gggctctgac aatgcaacaa tatactggca tattccagat actgcctacc 2880

Cont
B1

ctggaatcta cagaataaga tatttttgac acaatcggaa gcaggaactt ctgaaacccg	2940
ctgtcatact agcatttgaa ggaatttctt ctccttttga agttgtcact acttagtgaa	3000
aagttgacag atattgaaga aaagcttttc tctgtgcaca ttatagagtg aattcacaaa	3060
aaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaa	3108

<210> 12
 <211> 2271
 <212> DNA
 <213> Mus sp.

<400> 12	
atggcaaagc gaaccttctc caccttggag gcattcctca ttttcttctt ggtaataatg	60
acagtcacat cagtggccct tctcacctc ttgtttgtta ccagtgggac cattgaaaac	120
cacaaagatt caggaaatca ctggttttca accactctgg gctccacgac aaccagccc	180
cctccaatta cacagactcc aaacttccct tcatttcogga acttcagtgg ctactacatt	240
ggcgttggga gagcggattg cacaggacaa gtgtcagata tcaatttgat gggctatggc	300
aaaaatggcc agaatgcacg gggctcctc accaggctgt tcagccgtgc ttttatcttg	360
gcggatccag atgggtcaaa tcgaatggca tttgtgagcg tggaactatg tatgatttcc	420
caacgactga ggttggaggt cctgaagaga ctagagagta aatatggctc tctgtatcga	480
agagacaatg ttatcctgag tgccattcac acacactctg gccagcagg gtttttccaa	540
tatacactct atatactgc cagcggaggga ttcagcaacc ggacctttca gtacatagtc	600
tctgggatca tgaagagcat tgatatagct cacacaaatc ttaaaccagg caaaatcttt	660
atcaacaaag gaaatgttgc taatgtgcag atcaaccgaa gcccctcctc ttaccttctg	720
aatccacagt cagagagagc aaggatttct tcaaacacag acaaggaaat gctgggtctg	780
aaactgggtg atttgaatgg agaagacttg ggtcttatca gctgggttgc catccacccc	840
gtgagcatga acaatagcaa ccactttgtg aatagtgaca atatgggcta tgcggcttac	900
ctttttgagc aagaaaagaa caaaggctat ctgcctggac agggaccgtt tgtagcaggc	960
tttgcttcat caaatctcgg agacgtgtca cccaacattc ttggcccga ttgtgtcaac	1020
acaggggagt cttgtgacaa cgacaagagc acctgtccca acggtgggac tagcatgtgc	1080
atggccagcg gacctggaca agacatgttt gagagcacac acattatagg acggatcatc	1140
tatcagaagg ccaaggagct gtatgcctct gcctcccagg aggtgaccgg cccagtgtt	1200
gcagctcacc agtgggtgaa catgacagat gtgagcgtcc agctcaatgc cacacacaca	1260

gtgaagacgt gtaaacctgc cctgggctac agttttgccg caggcacaat tgatggagtt 1320
tcgggcctca atattacaca gggaactacg gaaggggatc cattctggga cactcttcgg 1380
gaccagctct tgggaaaacc atctgaagag attgtagagt gtcagaaacc caaaccaatc 1440
ctgcttcaca gtggagagct gacgatacca catccttggc aaccagatat tgttgatggt 1500
cagattgtta ccgttgggtc cttggccata gctgctatcc ctggggaatt aacaaccatg 1560
tcgggacgaa gatttcgtga ggcaattaaa aaagaatttg cactttatgg gatgaaggat 1620
atgaccgttg ttatcgagg tctaagcaat gtttatacac attacattac cacatatgaa 1680
gaataccagg ctacgcggtg cgaggcagca tctacaatct atggaccaca caccctgtct 1740
gcatacatcc aactcttcag agaccttgct aaggcaattg ctacggacac agtagccaac 1800
atgagcagtg gtcccgagcc tccattcttc aaaaatctaa tagcttcaact tattcctaact 1860
attgcggata gagcaccaat tggcaaacat tttggggatg tcttgagacc agcaaaacct 1920
gaatacagag tgggagaagt gggtgaagtt atattttagt gcgctaacct aaagaattca 1980
gcagagaacc agacctatca aaccttcttc actgtggaga aatacgagga ctctgtagct 2040
gactggcaga taatgtataa cgatgcctcc tgggagacga ggttttattg gcacaaagga 2100
atactgggtc tgagcaatgc aacaatatac tggcatattc cagatactgc ctaccctgga 2160
atctacagaa taagatattt tggacacaat cggaagcagg aacttctgaa acccgctgtc 2220
atactagcat ttgaaggaat ttcttctcct tttgaagttg tcactactta g 2271

<210> 13
<211> 756
<212> PRT
<213> Mus sp.

<400> 13

Met Ala Lys Arg Thr Phe Ser Thr Leu Glu Ala Phe Leu Ile Phe Leu
1 5 10 15

Leu Val Ile Met Thr Val Ile Thr Val Ala Leu Leu Thr Leu Leu Phe
20 25 30

Val Thr Ser Gly Thr Ile Glu Asn His Lys Asp Ser Gly Asn His Trp
35 40 45

Phe Ser Thr Thr Leu Gly Ser Thr Thr Thr Gln Pro Pro Pro Ile Thr
50 55 60

Gln Thr Pro Asn Phe Pro Ser Phe Arg Asn Phe Ser Gly Tyr Tyr Ile
65 70 75 80

Gly Val Gly Arg Ala Asp Cys Thr Gly Gln Val Ser Asp Ile Asn Leu
85 90 95

Met Gly Tyr Gly Lys Asn Gly Gln Asn Ala Arg Gly Leu Leu Thr Arg
100 105 110

Leu Phe Ser Arg Ala Phe Ile Leu Ala Asp Pro Asp Gly Ser Asn Arg
115 120 125

Met Ala Phe Val Ser Val Glu Leu Cys Met Ile Ser Gln Arg Leu Arg
130 135 140

Leu Glu Val Leu Lys Arg Leu Glu Ser Lys Tyr Gly Ser Leu Tyr Arg
145 150 155 160

Arg Asp Asn Val Ile Leu Ser Ala Ile His Thr His Ser Gly Pro Ala
165 170 175

Gly Phe Phe Gln Tyr Thr Leu Tyr Ile Leu Ala Ser Glu Gly Phe Ser
180 185 190

Asn Arg Thr Phe Gln Tyr Ile Val Ser Gly Ile Met Lys Ser Ile Asp
195 200 205

Ile Ala His Thr Asn Leu Lys Pro Gly Lys Ile Phe Ile Asn Lys Gly
210 215 220

Asn Val Ala Asn Val Gln Ile Asn Arg Ser Pro Ser Ser Tyr Leu Leu
225 230 235 240

Asn Pro Gln Ser Glu Arg Ala Arg Tyr Ser Ser Asn Thr Asp Lys Glu
245 250 255

Met Leu Val Leu Lys Leu Val Asp Leu Asn Gly Glu Asp Leu Gly Leu
260 265 270

Ile Ser Trp Phe Ala Ile His Pro Val Ser Met Asn Asn Ser Asn His
275 280 285

Cont
31
Phe Val Asn Ser Asp Asn Met Gly Tyr Ala Ala Tyr Leu Phe Glu Gln
290 295 300

Glu Lys Asn Lys Gly Tyr Leu Pro Gly Gln Gly Pro Phe Val Ala Gly
305 310 315 320

Phe Ala Ser Ser Asn Leu Gly Asp Val Ser Pro Asn Ile Leu Gly Pro
325 330 335

His Cys Val Asn Thr Gly Glu Ser Cys Asp Asn Asp Lys Ser Thr Cys
340 345 350

Pro Asn Gly Gly Pro Ser Met Cys Met Ala Ser Gly Pro Gly Gln Asp
355 360 365

Met Phe Glu Ser Thr His Ile Ile Gly Arg Ile Ile Tyr Gln Lys Ala
370 375 380

Lys Glu Leu Tyr Ala Ser Ala Ser Gln Glu Val Thr Gly Pro Val Leu
385 390 395 400

Ala Ala His Gln Trp Val Asn Met Thr Asp Val Ser Val Gln Leu Asn
405 410 415

Ala Thr His Thr Val Lys Thr Cys Lys Pro Ala Leu Gly Tyr Ser Phe
420 425 430

Ala Ala Gly Thr Ile Asp Gly Val Ser Gly Leu Asn Ile Thr Gln Gly
435 440 445

Thr Thr Glu Gly Asp Pro Phe Trp Asp Thr Leu Arg Asp Gln Leu Leu
450 455 460

Gly Lys Pro Ser Glu Glu Ile Val Glu Cys Gln Lys Pro Lys Pro Ile
465 470 475 480

Leu Leu His Ser Gly Glu Leu Thr Ile Pro His Pro Trp Gln Pro Asp
485 490 495

Ile Val Asp Val Gln Ile Val Thr Val Gly Ser Leu Ala Ile Ala Ala
500 505 510

Ile Pro Gly Glu Leu Thr Thr Met Ser Gly Arg Arg Phe Arg Glu Ala

515

520

525

Ile Lys Lys Glu Phe Ala Leu Tyr Gly Met Lys Asp Met Thr Val Val
530 535 540

Ile Ala Gly Leu Ser Asn Val Tyr Thr His Tyr Ile Thr Thr Tyr Glu
545 550 555 560

Glu Tyr Gln Ala Gln Arg Tyr Glu Ala Ala Ser Thr Ile Tyr Gly Pro
565 570 575

His Thr Leu Ser Ala Tyr Ile Gln Leu Phe Arg Asp Leu Ala Lys Ala
580 585 590

Ile Ala Thr Asp Thr Val Ala Asn Met Ser Ser Gly Pro Glu Pro Pro
595 600 605

Phe Phe Lys Asn Leu Ile Ala Ser Leu Ile Pro Asn Ile Ala Asp Arg
610 615 620

Ala Pro Ile Gly Lys His Phe Gly Asp Val Leu Gln Pro Ala Lys Pro
625 630 635 640

Glu Tyr Arg Val Gly Glu Val Val Glu Val Ile Phe Val Gly Ala Asn
645 650 655

Pro Lys Asn Ser Ala Glu Asn Gln Thr His Gln Thr Phe Leu Thr Val
660 665 670

Glu Lys Tyr Glu Asp Ser Val Ala Asp Trp Gln Ile Met Tyr Asn Asp
675 680 685

Ala Ser Trp Glu Thr Arg Phe Tyr Trp His Lys Gly Ile Leu Gly Leu
690 695 700

Ser Asn Ala Thr Ile Tyr Trp His Ile Pro Asp Thr Ala Tyr Pro Gly
705 710 715 720

Ile Tyr Arg Ile Arg Tyr Phe Gly His Asn Arg Lys Gln Glu Leu Leu
725 730 735

Lys Pro Ala Val Ile Leu Ala Phe Glu Gly Ile Ser Ser Pro Phe Glu
740 745 750

Val Val Thr Thr
755

<210> 14
<211> 682
<212> PRT
<213> Mus sp.

<400> 14

Phe Ser Gly Tyr Tyr Ile Gly Val Gly Arg Ala Asp Cys Thr Gly Gln
1 5 10 15

Val Ser Asp Ile Asn Leu Met Gly Tyr Gly Lys Asn Gly Gln Asn Ala
20 25 30

Arg Gly Leu Leu Thr Arg Leu Phe Ser Arg Ala Phe Ile Leu Ala Asp
35 40 45

Pro Asp Gly Ser Asn Arg Met Ala Phe Val Ser Val Glu Leu Cys Met
50 55 60

Ile Ser Gln Arg Leu Arg Leu Glu Val Leu Lys Arg Leu Glu Ser Lys
65 70 75 80

Tyr Gly Ser Leu Tyr Arg Arg Asp Asn Val Ile Leu Ser Ala Ile His
85 90 95

Thr His Ser Gly Pro Ala Gly Phe Phe Gln Tyr Thr Leu Tyr Ile Leu
100 105 110

Ala Ser Glu Gly Phe Ser Asn Arg Thr Phe Gln Tyr Ile Val Ser Gly
115 120 125

Ile Met Lys Ser Ile Asp Ile Ala His Thr Asn Leu Lys Pro Gly Lys
130 135 140

Ile Phe Ile Asn Lys Gly Asn Val Ala Asn Val Gln Ile Asn Arg Ser
145 150 155 160

Pro Ser Ser Tyr Leu Leu Asn Pro Gln Ser Glu Arg Ala Arg Tyr Ser
165 170 175

Ser Asn Thr Asp Lys Glu Met Leu Val Leu Lys Leu Val Asp Leu Asn
 180 185 190

Gly Glu Asp Leu Gly Leu Ile Ser Trp Phe Ala Ile His Pro Val Ser
 195 200 205

Met Asn Asn Ser Asn His Phe Val Asn Ser Asp Asn Met Gly Tyr Ala
 210 215 220

Ala Tyr Leu Phe Glu Gln Glu Lys Asn Lys Gly Tyr Leu Pro Gly Gln
 225 230 235 240

Gly Pro Phe Val Ala Gly Phe Ala Ser Ser Asn Leu Gly Asp Val Ser
 245 250 255

Pro Asn Ile Leu Gly Pro His Cys Val Asn Thr Gly Glu Ser Cys Asp
 260 265 270

Asn Asp Lys Ser Thr Cys Pro Asn Gly Gly Pro Ser Met Cys Met Ala
 275 280 285

Ser Gly Pro Gly Gln Asp Met Phe Glu Ser Thr His Ile Ile Gly Arg
 290 295 300

Ile Ile Tyr Gln Lys Ala Lys Glu Leu Tyr Ala Ser Ala Ser Gln Glu
 305 310 315 320

Val Thr Gly Pro Val Leu Ala Ala His Gln Trp Val Asn Met Thr Asp
 325 330 335

Val Ser Val Gln Leu Asn Ala Thr His Thr Val Lys Thr Cys Lys Pro
 340 345 350

Ala Leu Gly Tyr Ser Phe Ala Ala Gly Thr Ile Asp Gly Val Ser Gly
 355 360 365

Leu Asn Ile Thr Gln Gly Thr Thr Glu Gly Asp Pro Phe Trp Asp Thr
 370 375 380

Leu Arg Asp Gln Leu Leu Gly Lys Pro Ser Glu Glu Ile Val Glu Cys
 385 390 395 400

Gln Lys Pro Lys Pro Ile Leu Leu His Ser Gly Glu Leu Thr Ile Pro

Cont
B1

405

410

415

His Pro Trp Gln Pro Asp Ile Val Asp Val Gln Ile Val Thr Val Gly
420 425 430

Ser Leu Ala Ile Ala Ala Ile Pro Gly Glu Leu Thr Thr Met Ser Gly
435 440 445

Arg Arg Phe Arg Glu Ala Ile Lys Lys Glu Phe Ala Leu Tyr Gly Met
450 455 460

Lys Asp Met Thr Val Val Ile Ala Gly Leu Ser Asn Val Tyr Thr His
465 470 475 480

Tyr Ile Thr Thr Tyr Glu Glu Tyr Gln Ala Gln Arg Tyr Glu Ala Ala
485 490 495

Ser Thr Ile Tyr Gly Pro His Thr Leu Ser Ala Tyr Ile Gln Leu Phe
500 505 510

Arg Asp Leu Ala Lys Ala Ile Ala Thr Asp Thr Val Ala Asn Met Ser
515 520 525

Ser Gly Pro Glu Pro Pro Phe Phe Lys Asn Leu Ile Ala Ser Leu Ile
530 535 540

Pro Asn Ile Ala Asp Arg Ala Pro Ile Gly Lys His Phe Gly Asp Val
545 550 555 560

Leu Gln Pro Ala Lys Pro Glu Tyr Arg Val Gly Glu Val Val Glu Val
565 570 575

Ile Phe Val Gly Ala Asn Pro Lys Asn Ser Ala Glu Asn Gln Thr His
580 585 590

Gln Thr Phe Leu Thr Val Glu Lys Tyr Glu Asp Ser Val Ala Asp Trp
595 600 605

Gln Ile Met Tyr Asn Asp Ala Ser Trp Glu Thr Arg Phe Tyr Trp His
610 615 620

Lys Gly Ile Leu Gly Leu Ser Asn Ala Thr Ile Tyr Trp His Ile Pro
625 630 635 640

Asp Thr Ala Tyr Pro Gly Ile Tyr Arg Ile Arg Tyr Phe Gly His Asn
645 650 655

Arg Lys Gln Glu Leu Leu Lys Pro Ala Val Ile Leu Ala Phe Glu Gly
660 665 670

Ile Ser Ser Pro Phe Glu Val Val Thr Thr
675 680

<210> 15
<211> 2049
<212> DNA
<213> Mus sp.

<400> 15
ttcagtggct actacattgg cggtgggaga gcggtattgca caggacaagt gtcagatatc 60
aatttgatgg gctatggcaa aaatggccag aatgcacggg gtctcctcac caggctgttc 120
agccgtgctt ttatcttggc ggatccagat ggggtcaaatac gaatggcatt tgtgagcgtg 180
gaactatgta tgatttccca acgactgagg ttggagggtcc tgaagagact agagagtaaa 240
tatggctctc tgtatcgaag agacaatggt atcctgagtg ccattcacac acactctggc 300
ccagcagggg ttttccaata tacactctat atactcgcca gcgagggatt cagcaaccgg 360
acctttcagt acatagtctc tgggatcatg aagagcattg atatagctca cacaaatctt 420
aaaccaggca aaatctttat caacaaagga aatgttgcta atgtgcagat caaccgaagc 480
ccctcctctt accttctgaa tccacagtca gagagagcaa ggtattcttc aaacacagac 540
aaggaaatgc tgggtcttgaa actggtggat ttgaatggag aagacttggg tcttatcagc 600
tggtttgcca tccaccccggt gagcatgaac aatagcaacc actttgtgaa tagtgacaat 660
atgggctatg cggcttacct ttttgagcaa gaaaagaaca aaggctatct gcctggacag 720
ggaccgtttg tagcaggctt tgcttcatca aatctcggag acgtgtcacc caacattctt 780
ggcccgcatg gtgtcaacac aggggaggtc ttgtgacaacg acaagagcac ctgtcccaac 840
gggtgggccta gcatgtgcat ggccagcgga cctggacaag acatgtttga gagcacacac 900
attataggac ggatcatcta tcagaaggcc aaggagctgt atgcctctgc ctcccaggag 960
gtgaccggcc cagtgttgc agctcaccag tgggtgaaca tgacagatgt gagcgtccag 1020
ctcaatgcca cacacacagt gaagacgtgt aaacctgccc tgggctacag ttttgccgca 1080
ggcacaattg atggagtttc gggcctcaat attacacagg gaactacgga aggggatcca 1140

ttctgggaca ctcttcggga ccagctcttg ggaaaaccat ctgaagagat tgtagagtgt 1200
 cagaaacca aaccaatcct gcttcacagt ggagagctga cgataccaca tccttggcaa 1260
 ccagatattg ttgatgttca gattgttacc gttgggtcct tggccatagc tgctatccct 1320
 ggggaattaa caaccatgtc gggacgaaga tttcgtgagg caattaaaaa agaatttgca 1380
 ctttatggga tgaaggatat gaccgttggt atcgaggtc taagcaatgt ttatacacat 1440
 tacattacca catatgaaga ataccaggct cagcggtagc aggcagcatc tacaatctat 1500
 ggaccacaca ccctgtctgc atacatccaa ctcttcagag accttgctaa ggcaattgct 1560
 acggacacag tagccaacat gagcagtggc cccgagcctc cattcttcaa aaatctaata 1620
 gcttcactta ttctaatat tgcggataga gcaccaattg gcaaacattt tggggatgtc 1680
 ttgcagccag caaaacctga atacagagtg ggagaagtgg ttgaagttat atttgtaggc 1740
 gctaacccaa agaattcagc agagaaccag acccatcaaa ccttcctcac tgtggagaaa 1800
 tacgaggact ctgtagctga ctggcagata atgtataacg atgcctcctg ggagacgagg 1860
 ttttattggc acaaaggaat actgggtctg agcaatgcaa caatatactg gcatattcca 1920
 gatactgcct accctggaat ctacagaata agatattttg gacacaatcg gaagcaggaa 1980
 cttctgaaac ccgtgtcat actagcattt gaaggaattt cttctccttt tgaagttgtc 2040
 actacttag 2049

<210> 16
 <211> 4835
 <212> DNA
 <213> Mus sp.

<400> 16
 cctgcagcgg tgttctgaag agccgggcag aggatacaca agcatcccag caggcactct 60
 ggtttgcccg tgaacgatag atatgcgggg gtttgaatga gcagctgcag cagcgggttt 120
 ggggtctgtac acatgagtgc tgggtgtgctt agaggcatcg ggtccctttc agctggagtt 180
 gcagtacttg tgagtgccat atttggaaac acattgagaa atcagcctga gcaacctgca 240
 aggacaagg cacaagattc tgcattggtta tttgctctcc caggaggtga acacttggtt 300
 tgattaacag agtcagggtt gagatgccc gttgttcctc atcttggctc agaagaagca 360
 cctaggaata aaagctctaa gctggtatta agtagaatgg gcttaaagtc cactacagga 420
 aacaacagct agtgacagaa atggcaaagc gaaccttctc caccttgag gcatctctca 480
 ttttccttct ggtaataatg acagtcacca cagtggcctt tctcacctc ttgtttgtta 540

1
B1

ccagtgggac cattgaaaac cacaagatt caggaaatca ctggttttca accactctgg	600
gctccacgac aaccagccc cctccaatta cacagactcc aaacttcctt tcatttcgga	660
acttcagtgg ctactacatt ggcgttggga gagcagattg cacaggacaa gtgtcagata	720
tcaatttgat gggctatggc aaaaatggcc agaatgcacg gggctctctc accaggctgt	780
tcagccgtgc ttttatcttg gcggatccag atgggtcaaa tcgaatggca tttgtgagcg	840
tggaactatg tatgatttcc caacgactga ggttgagggt cctgaagaga ctagagagta	900
aatatggctc tctgtatcga agagacaatg ttatcctgag tgccattcac acacactctg	960
gccagcagg gtttttccaa tatacactct atatactcgc cagcgaggga ttcagcaacc	1020
ggacctttca gtacatagtc tctgggatca tgaagagcat tgatatagct cacacaaatc	1080
ttaaaaccagg caaaatcttt atcaacaaag gaaatgttgc taatgtgcag atcaaccgaa	1140
gcccctctc ttacctctg aatccacagt cagagagagc aaggatttct tcaaacacag	1200
acaaggaaat gctggctctg aaactggtgg atttgaatgg agaagacttg ggtcttatca	1260
gctggtttgc catccacccc gtgagcatga acaatagcaa ccactttgtg aatagtgaca	1320
atatgggcta tgcggcttac ctttttgagc aagaaaagaa caaaggctat ctgcctggac	1380
agggaccgtt tgtagcaggc tttgcttcat caaatctcgg agacgtgtca cccaacattc	1440
ttggcccgca ttgtgtcaac acaggggagt cttgtgacaa cgacaagagc acctgtccca	1500
acggtggggc tagcatgtgc atggccagcg gacctggaca agacatgttt gagagcacac	1560
acattatagg acggatcctc tatcagaagg ccaaggagct gtatgcctct gcctcccagg	1620
aggtgaccgg ccagtgctt gcagctcacc agtgggtgaa catgacagat gtgagcgtcc	1680
agctcaatgc cacacacaca gtgaagacgt gtaaacctgc cctgggctac agttttgcg	1740
caggcacaat tgatggagtt tcgggcctca atattacaca gggaactacg gaaggggac	1800
cattctggga cactcttcgg gaccagctct tgggaaaacc atctgaagag attgtagagt	1860
gtcagaaacc caaaccaatc ctgcttcaca gtggagagct gacgatacca catccttggc	1920
aaccagatat tgttgatgtt cagattgtta ccgttgggtc cttggccata gctgctatcc	1980
ctggggaatt aacaaccatg tcgggacgaa gatttcgtga ggcaattaaa aaagaatttg	2040
cactttatgg gatgaaggat atgaccgttg ttatcgcagg tctaagcaat gtttatacac	2100
attacattac cacatatgaa gaataccagg ctacgcggtg cgaggcagca tctacaatct	2160
atggaccaca caccctgtct gcatacatcc aactcttcag agaccttgct aaggcaattg	2220

ctacggacac agtagccaac atgagcagtg gtcccgagcc tccattcttc aaaaatctaa 2280
 tagcttctact tattcctaatt attgcgata gagcaccaat tggcaaacaat tttggggatg 2340
 tcttgcagcc agcaaaacct gaatacagag tgggagaagt ggttgaagtt atattttag 2400
 gcgctaacc aaagaattca gcagagaacc agacccatca aaccttcttc actgtggaga 2460
 aatacagga ctctgtagct gactggcaga taatgtataa cgatgcctcc tgggagacga 2520
 gggttttattg gcacaaagga atactgggtc tgagcaatgc aacaatatac tggcatattc 2580
 cagatactgc ctaccctgga atctacagaa taagatattt tggacacaat cggaagcagg 2640
 aacttctgaa acccgctgtc atactagcat ttgaaggaat ttcttctcct tttgaagttg 2700
 tcaactactta gtgaaaagtt gacagatatt gaagaaaagc ttttctctgt gcacattata 2760
 gagtgaattc acacaaatgt gaactgccag ttttaatttct gtaattgtct ctgtttgggg 2820
 gacaggatcat ttattgctaa tgggacagag gtatgtgttt gtgttggtgt atgattatga 2880
 gtatgcatgc taacaggaag agagaggag gagggaggga ggagggggag ggaggggaaga 2940
 aaggagggag agagagagtg agagaatgag agagagagtg agagagaaag agttattagt 3000
 gagcaagaga atatgagaga agggccactg acaaccaaatt accttgtgat ctttataccta 3060
 aagcatgatt ttcttgaag ctctgtggtt gtttaagaga taattccctc taatatgaaa 3120
 tccctgaaat ataattgacag tatttgaaga tatgtgaata atgtttatcc tatttattta 3180
 tagacttact aaatgagaac actagagaac tttctagaag tctctagaa tgatacttga 3240
 ttttacagag aggaaaagga gctttgattc tctttaggtt agaataaggt tagtatattt 3300
 ttccctagtc atattttaca aataccatgt aactttacta caaatatttg agcccagcta 3360
 aaatataccc agaaaattag cataccagtt ttgttttggt ttattttggt tttgcatcca 3420
 aacaagcata gtccttctga taagtcactt tagaatgat ctgcctggct cagggttatt 3480
 gttcatgctc agatcatttc cgcaattacc tccagagtc aactatgcga atgtcacttg 3540
 cagtgccttg atttatgcct tgtattcctc aaagtgtcct tatcctgcta agtcacacct 3600
 cttcctccca gcatttactc taaatgattt ttaatgtttt cgccaatcaa atgtacctca 3660
 cattacaaag ctttgccttg aatgtagatt tttaaaacaa aagtgttaag gctggaaatg 3720
 tagttatcaa agaggaagtt ttaaatgtat ctgttctttt atcagctact ccctccctca 3780
 tggctccctt gaatcactga atagttattt aaaccacat atccaatatg gtactcattc 3840
 ctgggtcttc acaattacag acatcatatc gaaatgattg ggctgacaat tcctttgaag 3900
 gacaaagtaa atatttaattg agaaatatag attctggaga ggcatttgaa aatcacaaat 3960

ggtacgcctc catttcctgt ttccaggct ggggtgttctg atttgggagg aaagcagccc 4020
 caaataattt ttaaataatga atctgaaaat aatgttttag aaattatgat ctgcacagtc 4080
 taattaatga gaattgtctg aaagtctag ctgcatttaa aattatgtaa gtttaactaaa 4140
 gccaatTTTT gaacccagc cataattgtg taggtaggta aaaagagcat tttaggagga 4200
 aaccgaactt catttcaaga ctgaatctgt tttaaagaa caatagtggg aaggtaaatac 4260
 ttcatttatt tccctatggg ttacctattt aaacatcgaa gattgaatca aaaggcacct 4320
 ggagcatatt ttggtaactc catttccac ttggtagttc tatggatgct aactgctgaa 4380
 gaataaactg atcggtattt tcaagggttg tgaacatgtc tctgatggg aataccgtat 4440
 taagtataaa ggttcaaat agttgatctc aaaactatac acacacacac aatatatata 4500
 tatatacaca cacacacatg tacacacaca cacacatgca catacacatg gtattgttta 4560
 aaatttattt ctcatgactt agaacaatat aaggattata caaggattca tttcccacca 4620
 tcattcctcc cagtgaagct ttctcaaag tctgagtagg agtttctcct ttctcactgg 4680
 taactatccc acagtggcca ttacatcact agtaatcggg gtgcccagcc ctgcatggaa 4740
 ataaatcaca gaaacataat ttcccagtag acttagtctc ttcaagcctg tgtgcttcta 4800
 gtgtataaaa tctgtaaaaa aaaaaaaaaa aaaaa 4835

<210> 17
 <211> 24
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Synthetic oligonucleotide sense primer U1107 directed to gene derived from Mus sp. liver

<400> 17
 gtttgagagc acacacatta tagg 24

<210> 18
 <211> 24
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Synthetic oligonucleotide antisense primer L1311 directed to gene derived from Mus sp. liver

<400> 18
 atattgaggc ccgaaactcc atca 24